CARNIVOROUS PLANT NEWSLETTER

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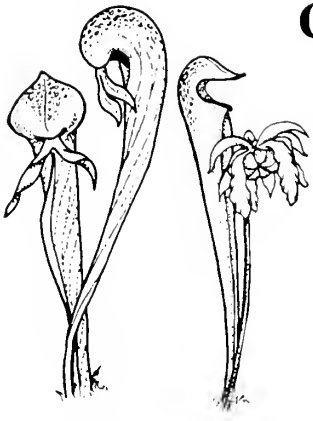

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Front Cover: *Genlisea uncinata*, see article on page 83. Photograph by Thomas Carow.

Back Cover: Carnivorous plants on stamps, see article on page 90.

Carnivorous Plant Newsletter is dedicated to spreading knowledge and news related to carnivorous plants. Reader contributions are essential for this mission to be successful. Do not hesitate to contact the editors with information about your plants, conservation projects, field trips, or noteworthy events. Contributors should review the "Instructions to Authors" printed in the March issue of each year. Advertisers should contact the editors.Views expressed in this publication are those of the authors, not the editorial staff.

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ICPS, Inc.
PMB 330
3310 East Yorba Linda Blvd.
Fullerton, CA 92831-1709, USA
icps@carnivorousplants.org

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Letter From The Editor: Attention Please!

Barry Meyers-Rice

I have four pieces of news.

Included with this mailing is your renewal form for ICPS membership. Return it as soon as possible to ensure your membership benefits are uninterrupted. The renewal form asks for your member number: this is the four digit number that leads the "2000" on the envelope that contained your issue of Carnivorous Plant Newsletter. (If the year code following your member number is something like 2001 or 2002, you do not have to renew this year.) Membership rates are unchanged for 2001. I am sorry to say that we are still unable to process VISA payments. This is an enormous inconvenience for our non-USA members, who often must go to heroic lengths to send monies to the ICPS. I ask for their understanding and patience for one more year.

Another important piece of paper in the mailing is the election form. We are losing a few of our board members and must replace them with energetic and motivated people. Please read the instructions on the election form and vote immediately.

The big ICPS news is, of course, the international ICPS conference that was held in San Francisco on 16-18 June. The conference was an amazing success. It was energizing, exhilarating, and exciting. We had three days of marvelous talks on cultivation, field reports, conservation, and science. A fun high point was a festive banquet with an entertaining talk and a marvelous auction. David Gray and Cynthia Slezak organized the entire conference. These two fine people are dedicated and driven, and the ICPS is in their debt. I am extremely pleased that they have chosen to run for board elections. David and Cynthia have been working on a set of important initiatives to advance the ICPS into the new century, and I am confident they will breathe new energy into the organization.

Finally, a fundraising campaign to support a meeting on *S. oreophila* conservation was publicized in the March mailing of Carnivorous Plant Newsletter. Since then, enough money was raised to fund this important event. I wish to thank everyone who donated. I will report more on this in a future issue of Carnivorous Plant Newsletter.

Carnivorous Plants in Orange County, Florida

Derek Glidden • 4747 West Waters Avenue, #2707 • Tampa, Florida 33614 USA • dglidden@illusionary.com

Keywords: travelogue: Florida, *Drosera capillaris, Drosera brevifolia, Sarracenia minor, Pinguicula caerulea, Utricularia.*

I took a trip to Orlando on September 12, 1998 to visit some of my favorite carnivorous plant spots. I try to get back there every few months to take a few photos and relax. (For some reason I find it relaxing to drive two hours so I can slog through muck for several hours in the middle of a hot Florida day, carrying ten pounds of camera equipment.)

Orlando is north of an area of central Florida known as the Green Swamp. The Green Swamp is several hundred square kilometers (a few hundred square miles) of scrub, marsh and cypress domes. An advantage of the vigorous tourism industry is that the area does not have to rely on much heavy industry for income, so the area is kept relatively clean and natural.

The landscape is extremely varied and changes quickly. It is not unusual to start at the edge of a cypress dome, walk over a field of barren white quartz sand, push through a mass of palmetto scrub, pass underneath a spreading, 500 year-old oak, and find yourself at the edge of a marshy depression filled with *Sarracenia minor* and *Drosera capillaris*—all within a few hundred yards. Although much of this land is still mostly untouched by development, most of the plants I have found are growing in habitats that exist because of human activity. There are many old access roads cut through the scrub, and over the years the ditches and depressions left by heavy trucks have filled in with muck and water. Plants have quickly reclaimed these areas. The areas I visit most frequently have an excellent representation of central Florida's native species:

Sarracenia minor

The *Sarracenia minor* populations are sparse, despite the Green Swamp being a primary habitat for this species. The plants are typically alone or in pairs; only in one or two locations have I seen a "clump" of *S. minor*. On this trip I found many very healthy plants and I hope they can remain in the area. Their habitat is not what I would expect; they are nearly always under partial to heavy shade. This probably accounts for their very green appearance—they have very little other coloration. This is also probably why they are much less robust than plants from other areas. Often they have two or three times as many leaves lying along the ground as they have erect leaves.

Drosera capillaris and *Drosera brevifolia*

Drosera capillaris is so common here that I can identify it from fifty meters. It is the most common carnivorous plant here, even out-representing *Utricularia subulata*! In most areas, and particularly in this part of Orlando, *D. capillaris* is extremely variable. I have seen red plants, green plants, plants with long petioles, plants with almost no petioles, plants with compact and flat rosettes, plants with almost vertical leaves, and plants mixing these characters in every combination! *Drosera brevifolia* is also

here if you know where to look—they are nearly always hiding underneath the leaf detritus along the sides of the paths. I suspect there may be interbreeding between the species, and this may account for some of the high variability in the *D. capillaris*.

Pinguicula caerulea

At least one species of *Pinguicula* is (very sparsely) represented in the area. There may be one or two other species but I am not an expert *Pinguicula* identifier, and I have yet to see more than one or two plants in flower. I may have run across a very few plants of *P. pumila* the first time I trekked through these woods, but in every subsequent visit I have not been able to find any more. (I am tentatively identifying them, by memory, by their flowers and because of their small size.) I fear the rarity of *Pinguicula* is an indication of the very tenuous hold these plants have in the area.

Utricularia subulata and *Utricularia juncea*

These two species are by far the most common *Utricularia* in the area. On one of my first ventures through the woods and paths while I was a student at the University of Central Florida, I came upon a muddy ditch filled with tens of thousands of *Utricularia juncea* in flower. I keep hoping I will see this again, but I missed the mass flowering this season by a week or two; the ground was littered with drying inflorescences and seed capsules. In some places, the ground is totally covered with these plants, so much that it looks like moss!

Utricularia olivacea

During this trip I photographed *Utricularia juncea* growing in a wet ditch. I finished the roll, but as the camera motor rewound the film I noticed what looked like tiny bits of crumbled white Styrofoam covering the algae. Could it be another *Utricularia*?

I was very excited—enough to step too far into the water and fill up my wading boots! I had already seen three other *Utricularia* species of in this area, and as one of my quests is to see and photograph every native Floridian carnivorous plant species, I have become adept at identifying the native species. The only aquatic *Utricularia* with tiny white flowers that grows in this area is *U. olivacea*. I was pretty sure that actually catching it in flower was rare indeed! (Fortunately I was able to dig another roll of film out of the bottom of my camera bag to take some more photos.)

At first glance, *U. olivacea* is not too striking. It was growing tangled amongst the algae mat along the edge of the water, and its vegetative parts could be mistaken for small specimens of *U. gibba*. The flowers are faintly creamy-white, and they are very small! *Utricularia olivacea* is certainly one of the smallest species of *Utricularia* and may be one of the smallest flowering plants in the world (Figure 1, page 72, top).

The inflorescences are very short, sticking up only a cm or two out of the muck, and bear just a single flower barely 2-3 mm in size. The lower lip is split into two lobes, and I could not locate the spur with the naked eye. The overall appearance of the flower is very different from most *Utricularia* species I am familiar with, which made me uncomfortable with any immediate identification. (I had only my camera with me. I was not expecting to need a microscope and my copy of Peter Taylor's book!) The traps were almost all black with prey. Unfortunately, I didn't have equipment available to find out what they were eating.

The plants were growing in a rut in the road made some years ago by trucks. The water varied from a few cm to nearly a metre deep in some spots, but the plants were all growing along the very edge, where there was just enough water to keep them a few cm above the substrate. (Imagine this: take a spool of light green sewing thread, chop it into 10 cm pieces, make a bowl of chocolate pudding, throw the whole mess into a bowl and stir for fifteen minutes. Pour the mess along the edge of the ditch.) They shared the environment with lots of reeds, a few grasses and other species of *Utricularia*. The only animal life that was immediately evident in the water was the ever-present mosquito fish, *Gambusia affinis*, who were delighted any time I would stir up the mud.

I am a *Utricularia* fan, so when I got back home one of the first things I wanted to do was try to confirm the sighting. I sent email to Barry Meyers-Rice with my tentative identification of the plant and my belief that this was rarely seen in flower. When I received a reply, Barry seemed more excited about the find than I was! (Ignorance is blissful and unexciting as well, I suppose.) After a phone call and instructions from Barry, I planned to return to the site the next weekend to take samples to send to the local college's herbarium.

Possibly the less said about that return trip the better, since what should have taken a few hours took the entire day due to bad thunderstorms and some of the worst interstate traffic problems I have ever encountered. Hurricane Georges came past Florida very soon after that trip and the storms prevented me from ever being able to deliver the specimens to the herbarium while they were still in good condition, but I at least found something new on this second trip: *Utricularia striata*!

Utricularia striata

On the return trip, I ran across *U. striata*. It has always been there, but this time it was in flower. I thought I recognized the flower shape and coloration by plants I had seen in another location, but these caught my eye in particular because at the base of each inflorescence was another small bud of an inflorescence. I remembered reading in Taylor that this was often seen in other species, and could be used as an aid to identification, but I did not have my copy of Taylor with me (again! what was I thinking?) so I collected a few pieces for identification. I mailed them off to Barry who was kind enough to confirm my identification for me, and also commented that the tiny little aborted inflorescences were unusual.

I imagine that they could have been a result of the strange weather in Florida in the few weeks previous. It was not unusual for the temperatures to be in the 70's (° F) one day, and in the 90's (° F) the next; bone dry one day and pouring rain the next. I suspect that the plants probably started flowering when the weather seemed to be getting cooler and drier, then aborted when it suddenly became much hotter and very wet again a day or two later. Perhaps a few days later, the weather changed again, which resulted in the plants deciding to flower again, this time completing the process.

This whole experience has been very exciting for me, as I have only been seriously collecting and studying carnivorous plants for about a year and a half now. In just this short time I have had the good luck to get one step closer to my goal of "capturing" every native Floridian species on film, and with a species of plant that is not only uncommon, but is rarely seen in flower, and I managed both.

Photos of this and other trips of mine can be found on the world wide web at http://www.illusionary.com/~dglidden/cp/ucf/

Figure 1: The tiny white flecks of *U. olivacea* flowers. Article on page 69.

Figure 1: Close-up of *U. olivacea* with flowers; U.S. penny (1.9 cm diameter) included for scale. Article on page 73.

Stalking the Pygmy Bladderwort, *Utricularia olivacea* (Lentibulariaceae)

Loran C. Anderson • Department of Biological Science • Florida State University • Tallahassee, FL 32306-4370 • USA • anderson@bio.fsu.edu

Keywords: observations: Florida, *Utricularia olivacea*.

The pygmy bladderwort, *Utricularia olivacea* Wright ex Grisebach, ranges along the coastal plain of the United States from New Jersey to Florida; it was recently recorded in Mississippi (Sorrie & Leonard, 1999). It also occurs in the West Indies (was originally discovered in Cuba) and Central and South America. Although widespread, this rare plant is seldom seen. Godfrey & Wooten (1981) stated: "its rarity is perhaps attributable more to the difficulty of perceiving the plant in the field than to its actual distribution." It is easily overlooked because its delicate stems look like algal filaments and the flowers, when present, are only 2-2.5 mm long. Small (1933) called it "one of the smallest (perhaps the smallest by weight) of all flowering plants." He placed species of *Utricularia* in eight separate genera and recognized this species as *Biovularia olivacea* (Wright) Kamienski. Small provided a meager drawing of the plant; a somewhat better illustration is found in Radford *et al.* (1968), but the best technical illustrations are in Allen (1959), Beal and Quay (1968), and Taylor (1989).

The diminutive plants usually occur floating submersed in shallow water, but they can occur in surface waters of ponds 6 meters deep. They are more likely to flower (and thus more likely to be recognized) when they become stranded on land as waters recede. I have knowingly seen this species twice in Franklin County, Florida. I first saw it in 1984 on the muddy bottom of a drying water-lily pond near Graham Creek. The flowers appeared like fine confetti scattered over the green, matted stems. My second sighting was in Big Branch Slough of Whiskey George Creek in a region locally known (somewhat affectionately) as Tate's Hell Swamp. The water levels in the shallow ditches that parallel the dirt roads in Big Branch Slough had dropped because of low rainfall during the summer of 1999, exposing gently sloped bare ground (a clayey sand) on which extensive mats of the pygmy bladderwort were found. After taking some voucher specimens for the Florida State University Herbarium (which involved pressing a clump of soil with the associated mat of plants), I took a fresh sample back to the university to be photographed. Ken Womble, our departmental photographer-illustrator, photographed the plants (Figure 1, page 72, bottom) in a studio with macro gear and flash lighting.

With the aid of a hand lens in the field, the flowers appeared a pale, ghostly white (more or less translucent), but with further magnification through photography, the faint yellow veins are apparent, and the anthers (often purple in my sample) suggested two "beady eyes" peering out from the corolla tube. Surprisingly, the petal surfaces were roughened rather than smooth. The rather detailed species diagnosis given by Taylor (1989) can now be augmented. He stated the racemes were 2-5 flowered; many in my sample had but a single flower. Taylor (1989) also described the upper (adaxial) lip of the corolla as transversely oblong with the apex truncate or emarginate, whereas in my material they are truncate apically but with tiny auricles basally. The smaller racemes, auriculate upper corolla lobes, and purple anthers add new dimensions to the species description of the seldom-seen Pygmy Bladderwort.

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Literature Reviews

Barthlott, W., Fischer, E., Frahm, J.P. & Seine, R. 2000, First Experimental Evidence for Zoophagy in the Hepatic *Colura*, Plant Biol., 2: 93-97.

For the first time, the entrapment of protists (primitive, unicellular organisms that can neither be classified as plants nor as animals) in the so-called water sacs (highly differentiated hollow lobules characteristic of several foliose liverworts) of a recently described species of *Colura* (Lejeuneaceae, Hepaticae, i.e. liverworts) has been observed directly. *C. zoophaga* from the Aberdare Mountains in Kenya, growing on twigs of *Cliffortia nitida* (Rosaceae) is able to capture and retain the ciliate *Blepharisma americana*. The protists might be killed by complete desiccation, a process that frequently occurs in the natural habitat of the investigated liverwort without killing the liverwort. Decomposition of the prey is likely to occur by the action of bacteria, and digestion products may easily be taken up through the uncuticularized epidermis of the liverwort. The carnivorous syndrome of *C. zoophaga* is incomplete, the most obvious "deficiency" being an apparent lack of specific attraction of protozoa in comparison to other bryophytes (i.e. mosses, hornworts, and liverworts). Even mosses that are hitherto unsuspected of carnivorous tendencies seem to attract the protozoa at the same rate as *Colura*. A distinction between plant carnivory (a syndrome observed only in vascular plants that have cuticles and specific mechanisms of nutrient uptake and redistribution) and zoophagy (Greek for "eating animals", describing perhaps a quite widespread phenomenon among plants, distinguished from carnivory by the lack of a series of features like specific attraction and digestion) seems a useful approach to the strange behaviour of hepatics presented in this paper. The term "zoophagous" is rather problematic, however, because it insinuates that metazoa (i.e. true multicellular animals) are eaten, while in the investigated case only protists were captured. It will be difficult to assess the specificity and importance of animal nutrition to hepatics (or to bryophytes in general), because plants that do not use roots for the uptake of nutrients (cf. the bromeliads that likewise have been suspected of carnivory) are generally adapted to the opportunistic utilization of any organic matter eventually "trapped" by their vegetative organs. (JS)

Global Carnivorous Plant Diversity
A Contribution from the Carnivorous Plant Specialist Group (CPSG) of the International Union for the Conservation of Nature (IUCN, SSC)

Jan Schlauer • Zwischenstr. 11 • 60594 Frankfurt/Main • Germany • jan@carnivorousplants.org

Keywords: conservation; biodiversity; taxa.

Introduction

For species conservation and for taxonomic purposes it is necessary to know the geographical distribution of the species concerned. The "value" of a region as a resource of biodiversity is usually estimated from the number of species occurring in and/or endemic to it. However, simple species numbers are not always a reliable measure of biodiversity because they depend on the circumscriptions of species, which can vary considerably with the species concept applied. In order to arrive at a somewhat more consolidated basis, taxonomic ranks above species (viz. section, genus, and family) have been added in the present survey. Additionally, a division between Lentibulariaceae + Byblidaceae (sympetalous plants) and the other (dialypetalous) families has been made in order to reflect differences between groups of different phylogenetic origin. The sympetalous families are believed to be members of a younger group (appearing in Early Tertiary) than the dialypetalous ones. While there are certainly young species in several of the other groups (e.g. in *Drosera*), the respective families are comparatively old (with assumedly pre-Tertiary origins).

In the following tables, the numbers of carnivorous plant species endemic to/occurring in the world's floristic regions and provinces (as outlined by Takhtajan, 1986) are given. Data were taken from the carnivorous plant database on the internet (http://www.labs.agilent.com/bot/cp_home). The families considered are: Droseraceae, Drosophyllaceae, Dioncophyllaceae, Nepenthaceae, Cephalotaceae, Roridulaceae, Sarraceniaceae, Byblidaceae, and Lentibulariaceae. Sectional classification follows Casper (1966) for *Pinguicula*, Fromm-Trinta (1977) for *Genlisea*, Schlauer (1996) for *Drosera*, and Taylor (1989) for *Utricularia*. No sections (i.e. only one section for all species in the genus) were recognized in *Nepenthes* (the genus does not show marked infrageneric differentiation above species level, and former attempts at a sectional classification were obviously artificial) and the remaining small genera.

Several taxa occur in more than one province, but some of these taxa are restricted to a single region. Therefore, the count of taxa endemic to a region may exceed the sum of taxa endemic to its constituent provinces.

The floristic regions and provinces are defined as follows:

I. Circumboreal Region
- 1 Arctic
- 2 Atlantic Europe
- 3 Central Europe
- 4 Illyria or Balkan
- 5 Pontus Euxinus
- 6 Caucasus
- 7 Eastern Europe
- 8 Northern Europe
- 9 Western Siberia
- 10 Altai-Sayan
- 11 Central Siberia
- 12 Transbaikalia
- 13 Northeastern Siberia
- 14 Okhotsk-Kamchatka
- 15 Canada incl. Great Lakes

II. Eastern Asiatic Region
- 16 Manchuria
- 17 Sakhalin-Hokkaido
- 18 Japan-Korea
- 19 Volcano-Bonin
- 20 Ryukyu or Tokara-Okinawa
- 21 Taiwan
- 22 Northern China
- 23 Central China
- 24 Southeastern China
- 25 Sikang-Yuennan
- 26 Northern Burma
- 27 Eastern Himalaya
- 28 Khasi-Manipur

III. North American Atlantic Region
- 29 Appalachians
- 30 Atlantic and Gulf Coastal Plain
- 31 North American Prairies

IV. Rocky Mountain Region
- 32 Vancouver
- 33 Rocky Mountains

V. Macaronesian Region
- 34 Azores
- 35 Madeira
- 36 Canaries
- 37 Cape Verde

VI. Mediterranean Region
- 38 Southern Morocco
- 39 Southwestern Mediterranean
- 40 South Mediterranean
- 41 Iberia
- 42 Baleares
- 43 Liguria-Tyrrhenia
- 44 Adriatic
- 45 East Mediterranean
- 46 Crimea-Novorossijsk

VII. Saharo-Arabian Region
- 47 Sahara
- 48 Egypt-Arabia

VIII. Irano-Turanian Region
- 49 Mesopotamia
- 50 Central Anatolia
- 51 Armenia-Iran
- 52 Hyrcania
- 53 Turania or Aralo-Caspia
- 54 Turkestan
- 55 Northern Baluchistan
- 56 Western Himalaya
- 57 Central Tien Shan
- 58 Dzungaria-Tien Shan
- 59 Mongolia
- 60 Tibet

IX. Madrean Region
- 61 Great Basin
- 62 California
- 63 Sonora
- 64 Mexican Highlands

X. Guineo-Congolian Region
- 65 Upper Guinea
- 66 Nigeria-Cameroon
- 67 Congo

XI. Usambara-Zululand Region
- 68 Zanzibar-Inhambane
- 69 Tongoland-Pondoland

XII. Sudano-Zambezian Region
- 70 Zambezi
- 71 Sahel
- 72 Sudan
- 73 Somalia-Ethiopia
- 74 South Arabia
- 75 Socotra
- 76 Oman
- 77 South Iran
- 78 Sindia

XIII. Karoo-Namib Region
- 79 Namibia
- 80 Namaland
- 81 Western Cape
- 82 Karoo

XIV. St.Helena and Ascension Region
- 83 St. Helena and Ascension

XV. Madagascan Region
- 84 Eastern Madagascar
- 85 Western Madagascar
- 86 Southern and Southwestern Madagascar
- 87 Comoro
- 88 Mascarenes
- 89 Seychelles

XVI. Indian Region
- 90 Ceylon (Sri Lanka)
- 91 Malabar
- 92 Deccan
- 93 Upper Gangetic Plain
- 94 Bengal

XVII. Indochinese Region
- 95 South Burma
- 96 Andamanes
- 97 South China
- 98 Thailand
- 99 North Indochina
- 100 Annam
- 101 South Indochina

XVIII. Malesian Region
- 102 Malaya
- 103 Borneo
- 104 Philippines
- 105 Sumatra
- 106 South Malesia
- 107 Celebes
- 108 Moluccas and W New Guinea

109 Papua
110 Bismarck Archipelago
XIX. Fijian Region
111 New Hebrides
112 Fiji
XX. Polynesian Region
113 Micronesia
114 Polynesia
XXI. Hawaiian Region
115 Hawaii
XXII. Neocaledonian Region
116 New Caledonia
XXIII. Caribbean Region
117 Central America
118 West Indies
119 Galapagos
XXIV. Region of the Guayana Highlands
120 Guayana
XXV. Amazonian Region
121 Amazonia
122 Llanos
XXVI. Brazilian Region
123 Caatingas
124 Central Brazilian Uplands
125 Chaco
126 Atlantic Brazil
127 Parana
XXVII. Andean Region
128 Northern Andes
129 Central Andes
XXVIII. Cape Region
130 Cape
XXIX. Northeast Australian Region
131 North Australia
132 Queensland
133 Southeast Australia
134 Tasmania
XXX. Southwest Australian Region
135 Southwest Australia
XXXI. Central Australian or Eremaean Region
136 Eremaea
XXXII. Fernandezian Region
137 Juan Fernandez
XXXIII. Chile-Patagonian Region
138 Northern Chile
139 Central Chile
140 Pampas
141 Patagonia
142 Tierra del Fuego
XXXIV. Region of the South Subantarctic Islands
143 Tristan-Gough
144 Kerguelen
XXXV. Neozeylandic Region
145 Lord Howe
146 Norfolk
147 Kermadec
148 Northern New Zealand
149 Central New Zealand
150 Southern New Zealand
151 Chatham
152 New Zealand Subantarctic Islands

Conclusions and Recommendations

Generally, centres with comparatively high numbers of indigenous carnivorous plant taxa are also centres of carnivorous plant endemism (SW Australia and the Malesian region for dialypetalous carnivorous plants, in the first line the genera *Drosera* and *Nepenthes*, respectively; Mexico, the Guayana Highland, and N Australia for sympetalous carnivorous plants, in the first line *Pinguicula* and *Utricularia*). The areas of greatest species richness are usually also rich in indigenous and endemic sections. Generic and family diversity is fairly low in most regions (the highest count of indigenous genera being five in SE N America and in Upper Guinea, the highest family count being four in W New Guinea, NE and SW Australia). Endemic genera are found in SE N America (*Dionaea*), W N America (*Darlingtonia*), the SW Mediterranean (*Drosophyllum*), Upper Guinea (*Triphyophyllum*), the Guayana Highland (*Heliamphora*), the Cape region (*Roridula*), and SW Australia (*Cephalotus*).

Future efforts of species and especially of habitat conservation in connection with carnivorous plants should take into account the global "importance" of the floristic regions and provinces concerned. Floristic provinces marked by high endemism should be given particular attention. Perhaps surprisingly for some, areas of great carnivorous plant diversity (especially at higher taxonomic ranks like genera and families) are not confined to the tropics or to developing countries. It is to be hoped that this information will reach the persons and organizations responsible for and in charge of appropriate legislation.

Table I. Global diversity of carnivorous plants. Numbers of taxa are given. If no taxa occur in a region with more than one province, the null data for the individual provinces have been omitted. E: endemic; I: indigenous.

		Dialypetalous								Sympetalous							
		Families		Genera		Sections		Species		Families		Genera		Sections		Species	
Region	Province	E	I	E	I	E	I	E	I	E	I	E	I	E	I	E	I
I	1	0	1	0	1	0	1	0	2	0	1	0	2	0	3	0	9
	2	0	1	0	1	0	1	0	4	0	1	0	2	0	4	0	12
	3	0	2	0	2	0	2	0	5	0	1	0	2	0	3	1	12
	4	0	1	0	1	0	1	0	2	0	1	0	2	0	3	0	6
	5	0	2	0	2	0	2	0	4	0	1	0	2	0	2	0	4
	6	0	2	0	2	0	2	0	2	0	1	0	1	0	1	0	1
	7	0	2	0	2	0	2	0	5	0	1	0	2	0	2	0	5
	8	0	1	0	1	0	1	0	3	0	1	0	2	0	3	0	8
	9	0	1	0	1	0	1	0	2	0	1	0	2	0	3	0	6
	10	0	1	0	1	0	1	0	2	0	1	0	2	0	3	0	7
	11	0	1	0	1	0	1	0	2	0	1	0	2	0	3	0	7
	12	0	1	0	1	0	1	0	2	0	1	0	2	0	3	0	6
	13	0	1	0	1	0	1	0	2	0	1	0	2	0	3	0	6
	14	0	1	0	1	0	1	0	2	0	1	0	2	0	2	0	6
	15	0	2	0	2	0	2	1	5	0	1	0	2	0	6	0	15
	Total 15	0	3	0	3	0	3	2	7	0	1	0	2	0	9	3	26
II	16	0	1	0	2	0	2	0	3	0	1	0	2	0	2	0	4
	17	0	1	0	1	0	1	0	2	0	1	0	2	0	3	0	6
	18	0	1	0	2	0	5	0	6	0	1	0	2	0	6	2	13
	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2
	21	0	1	0	1	0	3	0	3	0	1	0	1	0	4	0	7
	22	0	0	0	0	0	0	0	0	0	1	0	2	0	3	0	3
	23	0	1	0	1	0	1	0	1	0	1	0	2	0	5	0	8
	24	0	1	0	1	0	3	0	4	0	1	0	1	0	4	1	7
	25	0	0	0	0	0	0	0	0	0	1	0	2	0	5	0	10
	26	0	1	0	1	0	1	0	1	0	1	0	1	0	4	0	8
	27	0	1	0	1	0	1	0	1	0	1	0	2	0	5	0	11
	28	0	2	0	2	0	3	1	3	0	1	0	1	0	6	0	10
	Total 13	0	2	0	3	0	6	1	9	0	1	0	2	0	9	6	33
III	29	0	2	0	2	0	2	0	5	0	1	0	1	0	5	0	14
	30	0	2	1	3	1	3	7	13	0	1	0	2	0	6	6	20
	31	0	1	0	1	0	1	0	4	0	1	0	1	0	2	0	6
	Total 3	0	2	1	3	1	3	11	17	0	1	0	2	0	6	8	23
IV	32	0	2	1	2	1	2	1	3	0	1	0	2	0	2	0	7
	33	0	1	0	1	0	1	0	2	0	1	0	1	0	1	0	3
	Total 2	0	2	1	2	1	2	1	4	0	1	0	2	0	2	0	7
V	Total 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table1: Continued

Region	Province	Dialypetalous								Sympetalous							
		Families		Genera		Sections		Species		Families		Genera		Sections		Species	
		E	I	E	I	E	I	E	I	E	I	E	I	E	I	E	I
VI	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	39	1	1	1	1	1	1	1	1	0	1	0	2	0	4	0	6
	40	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	3
	41	0	1	0	1	0	1	0	1	0	1	0	2	0	2	3	5
	42	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	2
	43	0	1	0	2	0	2	0	2	0	1	0	1	0	3	1	3
	44	0	1	0	1	0	1	0	1	0	1	0	2	0	3	0	3
	45	0	1	0	1	0	1	0	1	0	1	0	2	0	3	0	4
	46	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0
	Total 9	1	2	1	3	1	3	1	5	0	1	0	2	0	5	4	15
VII	Total 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VIII	49	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1
	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	51	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1
	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	53	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0
	54	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	3
	55	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1
	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	60	0	1	0	1	0	1	0	1	0	1	0	2	0	5	0	16
	Total 12	0	1	0	2	0	2	0	2	0	1	0	2	0	5	0	17
IX	61	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0
	62	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	3
	63	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	2
	64	0	0	0	0	0	0	0	0	0	1	0	2	2	10	36	42
	Total 4	0	1	0	1	0	1	0	1	0	1	0	2	2	10	36	43
X	65	0	2	1	3	1	4	1	4	0	1	0	2	0	10	1	27
	66	0	1	0	1	0	2	0	3	0	1	0	2	1	11	2	26
	67	0	1	0	2	0	2	0	1	0	1	0	2	0	9	1	25
	Total 3	1	2	1	3	1	4	1	7	0	1	0	2	2	12	9	38
XI	68	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
	69	0	1	0	1	0	1	1	2	0	1	0	1	0	4	0	8
	Total 2	0	1	0	1	0	1	1	3	0	1	0	1	0	4	0	8

Table1: Continued

		Dialypetalous								Sympetalous							
		Families		Genera		Sections		Species		Families		Genera		Sections		Species	
Region	Province	E	I	E	I	E	I	E	I	E	I	E	I	E	I	E	I
XII	70	0	1	0	2	0	4	6	13	0	1	0	2	1	11	8	36
	71	0	1	0	1	0	2	0	2	0	1	0	2	0	5	0	18
	72	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0
	73	0	0	0	0	0	0	0	0	0	1	0	1	0	5	0	11
	74	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1
	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	78	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	3
	Total 9	0	1	0	2	0	4	6	13	0	1	0	2	1	11	8	40
XIII	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	80	0	0	0	0	0	0	0	0	0	1	0	1	0	3	0	8
	81	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1
	82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total 4	0	0	0	0	0	0	0	0	0	1	0	1	0	3	0	8
XIV	83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XV	84	0	2	0	2	0	3	3	7	0	1	0	2	0	7	0	18
	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	87	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1
	88	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1
	89	0	1	0	1	0	1	1	1	0	0	0	0	0	0	0	0
	Total 6	0	2	0	2	0	3	4	8	0	1	0	2	0	7	0	18
XVI	90	0	2	0	2	0	4	1	4	0	1	0	1	0	5	1	14
	91	0	1	0	1	0	3	0	3	0	1	0	1	0	4	8	23
	92	0	1	0	1	0	3	0	3	0	1	0	1	0	6	0	17
	93	0	1	0	1	0	1	0	1	0	1	0	1	0	5	0	9
	94	0	1	0	2	0	3	0	3	0	1	0	1	0	4	0	9
	Total 5	0	2	0	3	0	6	1	6	0	1	0	1	0	7	12	27
XVII	95	0	1	0	1	0	1	0	1	0	1	0	1	0	5	0	11
	96	0	2	0	2	0	3	0	7	0	1	0	1	0	5	1	10
	97	0	2	0	2	0	5	0	6	0	1	0	1	1	6	1	9
	98	0	2	0	2	0	4	0	6	0	1	0	1	0	6	1	15
	99	0	1	0	1	0	2	0	2	0	1	0	1	0	5	0	8
	100	0	2	0	2	0	2	0	4	0	1	0	1	0	5	0	14
	101	0	1	0	1	0	1	0	4	0	1	0	1	0	7	2	19
	Total 7	0	2	0	2	0	5	2	11	0	1	0	1	1	8	7	24

Table1. Continued

		Dialypetalous								Sympetalous							
		Families		Genera		Sections		Species		Families		Genera		Sections		Species	
Region	Province	E	I	E	I	E	I	E	I	E	I	E	I	E	I	E	I
XVIII	102	0	2	0	2	0	2	2	14	0	1	0	1	0	7	1	13
	103	0	2	0	2	0	4	26	41	0	1	0	1	0	6	0	10
	104	0	2	0	2	0	4	13	18	0	1	0	1	0	5	1	9
	105	0	2	0	2	0	2	20	32	0	1	0	1	0	5	1	10
	106	0	1	0	2	0	3	0	4	0	1	0	1	0	3	0	4
	107	0	2	0	2	0	3	3	8	0	1	0	1	0	3	0	4
	108	0	2	0	2	0	5	7	16	0	2	0	2	0	7	1	12
	109	0	2	0	2	0	4	0	8	0	1	0	1	0	6	0	10
	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total 9	0	2	0	3	0	7	81	92	0	2	0	2	0	9	4	23
XIX	Total 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XX	Total 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXI	115	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
XXII	116	0	2	0	2	0	2	2	2	0	1	0	1	0	2	0	2
XXIII	117	0	1	0	1	0	1	1	4	0	1	0	[illegible]	0	19	6	35
	118	0	1	0	1	0	1	0	3	0	1	0	[illegible]	1	13	5	26
	119	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1
	Total 3	0	1	0	1	0	1	1	4	0	1	0	[illegible]	1	20	11	47
XXIV	120	0	2	1	2	2	4	8	10	0	1	0	2	2	19	3	45
XXV	121	0	1	0	1	0	2	5	10	0	1	0	2	0	15	5	41
	122	0	1	0	1	0	1	1	2	0	1	0	1	0	4	0	8
	Total 2	0	1	0	1	0	2	6	11	0	1	0	2	0	15	6	41
XXVI	123	0	1	0	1	0	2	0	2	0	1	0	2	0	6	0	9
	124	0	1	0	1	0	2	4	6	0	1	0	2	0	14	11	46
	125	0	0	0	0	0	0	0	0	0	1	0	1	0	4	0	7
	126	0	1	0	1	0	2	1	5	0	1	0	2	0	10	2	22
	127	0	1	0	1	0	1	0	2	0	1	0	2	0	10	0	23
	Total 5	0	1	0	1	0	2	5	10	0	1	0	2	1	17	17	51
XXVII	128	0	1	0	1	0	1	2	3	0	1	0	2	0	6	2	15
	129	0	0	0	0	0	0	0	0	0	1	0	2	0	9	0	16
	Total 2	0	1	0	1	0	1	2	3	0	1	0	2	0	9	3	22
XXVIII	130	1	2	1	2	1	3	15	15	0	1	0	1	0	3	0	5
XXIX	131	0	1	0	2	0	5	11	18	0	2	0	2	0	9	23	42
	132	0	2	0	2	0	7	3	11	0	2	0	2	0	9	2	19
	133	0	1	0	2	0	10	1	11	0	1	0	1	0	8	2	14
	134	0	1	0	1	0	6	0	7	0	1	0	1	0	4	0	7
	Total 1	0	2	0	2	0	10	18	30	0	2	0	2	1	11	33	52
XXX	135	1	2	1	2	4	10	63	69	0	2	0	2	1	5	11	14
XXXI	136	0	1	0	1	0	3	0	3	0	0	0	0	0	0	0	0
XXXII	137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table1: Continued

Region	Province	Dialypetalous								Sympetalous							
		Families		Genera		Sections		Species		Families		Genera		Sections		Species	
		E	I	E	I	E	I	E	I	E	I	E	I	E	I	E	I
XXXIII	138	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	139	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	1
	140	0	1	0	1	0	1	0	4	0	1	0	1	0	6	0	13
	141	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
	142	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
	Total 5	0	1	0	1	0	1	1	5	0	1	0	2	0	7	2	14
XXXIV	Total 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
XXXV	145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	147	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	148	0	1	0	1	0	5	0	6	0	1	0	1	0	3	0	4
	149	0	1	0	1	0	5	0	6	0	1	0	1	0	2	0	3
	150	0	1	0	1	0	4	0	5	0	1	0	1	0	1	0	2
	151	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
	152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total 8	0	1	0	1	0	5	1	6	0	1	0	1	0	3	1	4

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The Giant *Genlisea uncinata* P.Taylor & Fromm-Trinta

Fernando Rivadavia • Rua Inacio Pedroso 230 • Sao Paulo, S.P. 05612-050 • Brazil • frl@mtecnetsp.com.br

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Genlisea uncinata P.Taylor & Fromm-Trinta was described as a new species in 1983, based on a single collection of a few dried inflorescences. These had been collected three years previously on a faraway peak of the Serra do Sincora, which is part of the Chapada Diamantina, a series of sandstone highlands in the state of Bahia, northeastern Brazil.

That collection was the only proof that *G. uncinata* existed, so I decided to go look for it. Keen as I am on finding rare species of carnivorous plants in the wild, *G. uncinata* was one hell of a platefull! After all, here was a mysterious plant that had only been collected once upon a time from a poorly documented location. I did not know what kind of habitats it grew in. Was it rare? Could it be found all year long? Is it an annual or a perennial? But if I found it, what a boon it would be! It had never been introduced into cultivation, and promised to be a large version of the already very attractive *G. violacea* St. Hil. Furthermore, it came from the carnivorous plant-rich Chapada Diamantina, so even if I were unsuccessful in my search for *G. uncinata*, I would no doubt be kept busy with numerous other interesting carnivorous plant species.

I had very little information to rely upon. It was reported to grow between 1300 and 1500m altitude, somewhere northwest of a small village called Mucugê. I also knew it was somewhat similar to *G. violacea*, but with robust inflorescences 23-40cm high and purplish-blue flowers with a hooked spur (P.Taylor & Fromm-Trinta, 1983).

In July 1995 I found the time, gathered the courage, and jumped on a bus to Bahia, not yet sure how to actually get to the village of Mucugê—that would be decided along the way. Nearly two days and a few buses later, I finally arrived in Mucugê, a small colonial-style town. It was surrounded by breathtaking mountains, covered in the 'campo rupestre' vegetation typical of Brazilian highlands. This consists of mostly herbaceous plants (lots of grasses) as well as scattered short bushes and trees, growing in sandy/rocky soils on Precambrian sandstone highlands. It is very similar to the Venezuelan tepui vegetation, and superficially even to the South African fynbos. Typical plant families of campos rupestres include: Velloziaceae, Eriocaulaceae, Asteraceae, Orchidaceae, Bromeliaceae, Poaceae, Melastomataceae, Fabaceae, Cyperaceae, Myrtaceae, Xyridaceae, Rubiaceae, Euphorbiaceae, Malpighiaceae, and of course Droseraceae (*Drosera*) and Lentibulariaceae (*Genlisea* and *Utricularia*) (Stannard, 1995). The biodiversity of the flora of campos rupestres is truly fantastic, and the incredible number of micro-habitats results in occasional oddities such as cacti growing only a meter apart from *Drosera*!

Fortunately campo rupestre vegetation is such that you may usually hike in whatever direction is desired. But where was I to start looking? The location data I had for *G. uncinata* was vague, however I optimistically hoped that once in Mucugê I would find this species growing somewhere in the area (if not everywhere!). For two days I hiked all around, finding interesting carnivorous plants like *Genlisea aurea* St.Hil., *Drosera montana* St.Hil. var. *tomentosa* (St.Hil.) Diels, *Utricularia flaccida* DC., and a beautiful white form of *U. blanchetti* DC. which grew everywhere—like grass!—but not a single specimen of *G. uncinata*.

My explorations were in the middle of the dry season, while the type material of

G. uncinata had been collected in flower in March. Was I too late in the season to catch it alive? If the supposedly closely-related *G. violacea* was a good reference, there was a big chance I had been trekking for two days through areas that during wetter times of the year were full of *G. uncinata*. Perhaps, like *G. violacea*, *G. uncinata* survived during the dry season only as seed, and might be found during the dry season only in a few very wet habitats?

Considering that I wanted to explore two other areas of the Chapada Diamantina on that trip and that my winter vacations from university were limited, I decided that my third day at Mucugê would be my last. If I did not find *G. uncinata*, then I would just have to leave it for some future trip during a summer wet season. (I had been forced to do that many times in the past while searching for other rare species.)

I set out early in my last morning at Mucugê, towards a very high mountain I hoped was the right one. It was a very long hike indeed, but it was my last hope. After about five hours of bush-whacking through bush (most of it up a very steep mountainside), I was exhausted, burning from the sun and heat, and dripping with sweat. I was getting close to the top of what was the highest mountain in the area, but still no *G. uncinata*. I was considering giving up and returning to Mucugê so I would arrive well before sunset. Or should I hike around for another half hour or so? At least I could reach the summit where I would have a nice view as a reward...

As I was trying to decide what to do, I crossed an area with tall grasses growing in black peaty/sandy soil, and suddenly there it was—*G. uncinata* in flower! Speechless, I dropped to my knees. I could not believe what I was seeing—it was much larger than I had expected. Looking around, I began finding more and more inflorescences, up to 80cm in length—double what Taylor and Fromm-Trinta had described! And most interesting, they were also thick, even succulent. Some were as thick at the base as a pencil! All the effort put into finding *G. uncinata* had more than payed off.

It is impossible to put to words the wonderful feeling I had when I found those magnificently gigantic plants. There I was, alone on top of an isolated mountain in the middle of nowhere, surrounded by beautiful scenery, a cool breeze filling my nostrils with greenery and giving me shivers as it blew against my sweaty shirt stuck to my torso. But I was oblivious to all this. I forgot all the scratches and bruises from the past three days. I kneeled on the ground, focused on the *G. uncinata*, my hands raised to my dishevelled hair and sweaty red face, my mouth open in awe, wordless at first, but then breaking the absolute silence of the mountain with shouts and laughter as I celebrated my fantastic discovery. That was surely among the top five most memorable days in all of my carnivorous plant experience!

Figure 1: The exhuberant author with his prized *G. uncinata* discovery near Mucugê.

In time I calmed down enough and caught my breath to concentrate on the task ahead. First thing: pictures. Second: herbarium specimens (see Figure 1). Third: collect seeds and live plants. Last of all: explore the surrounding areas for other *G. uncinata* populations.

I waded back and forth through the high grasses, finding more and more *G. uncinata*, and I observed that each of the thick inflorescences

had up to four open purplish-blue flowers. Although the *G. uncinata* plants are huge, the flowers are not much larger than those of *G. violacea* (measuring nearly 1.5 cm from the tip of the lower to the tip of the upper lip). The characteristic hooked spurs are around 1cm long (see Front Cover). The pedicels are very short, 6-8.5mm long and become reflexed when in fruit, as also occurs with *G. violacea* and *G. lobata*.

I soon noticed that the yellow patch at the base of the lower lip of several *G. uncinata* flowers was neatly eaten out, leaving a small gap in the corolla. I had already observed this at several other locations with *G. violacea* and a few purplish-flowered *Utricularia* species. I wonder if there is some bug that fancies the taste of the yellow pigment in Lentibulariaceae flowers! (I have seen partially or completely eaten all-yellow *Utricularia* and *Genlisea* flowers countless times.)

The spatulate-obovate leaves of *G. uncinata* were curiously very thick. Furthermore, they were usually few in number or even absent. I suspect that the long succulent inflorescences may actually be the main photosynthetic organ—at least during flowering season. I also noticed that both the leaves and flower scapes originated from a point 1-5 cm below ground. This may be an adaptation to protect the meristem from fires, but is surely also important to help support the heavy peduncles and keep them from breaking off with the wind.

There were still more surprises ahead as I stuck my pocketknife into the moist black soil to dig out a specimen. The block of soil was white underneath. No, the soil had not changed color, it had simply been substituted by an incredibly dense mass of the largest *Genlisea* traps I had ever seen! Some traps were so thick that I could open up the hollow section above the 'arms' with my fingernail, slicing the tube just like a *Sarracenia* leaf! A deep breath, try to relax, and count to ten: one, two, three....

Unfortunately I was unprepared for this amazing surprise and my small pocketknife was only capable of digging down ten centimeters or so. Although I dug up several *G. uncinata* specimens, the long traps were always severed at a point above the division into the two corkscrew arms. I could only wonder what a spectacle *G. uncinata* would be if cultivated like that *Genlisea* grown by Geoff Wong, pictured on the cover of Carnivorous Plant Newsletter 24:2! I have no doubt the traps of *G. uncinata* can grow longer than 20cm and are only rivalled in robustness by those of *G. guianensis* N.E.Br., a species which I recently saw in the wild at the Venezuelan Gran Sabana and in northern Minas Gerais state, Brazil. As with most *Genlisea* species, *G. uncinata* produces two kinds of traps: long ones that grow straight down into the soil and short ones that grow more horizontally beneath the surface (see Studnicka, 1996).

I discovered several other nearby *G. uncinata* populations, always growing in moist black sandy/peaty soil with tall grasses. Nevertheless, with all those *G. uncinata* inflorescences I found no ripe seeds. The scapes were just too young. Although Taylor and Fromm-Trinta claim that as many as 21 flowers may be produced on each scape of *G. uncinata*, I am sure larger branching inflorescences may produce double this amount.

The size and robustness of the *G. uncinata* inflorescences, and the fact that the soil they grew in was still humid in the middle of the dry season, quickly convinced me that *G. uncinata* was not an annual (as *G. violacea* usually is in the wild). As I recalled how the mountaintop where they grew had been covered in heavy clouds early in the morning and late in the afternoon on each of the days I spent at Mucugê, it became obvious that condensation was the main source of water for *G. uncinata* (at least during the dry season).

Thinking of those clouds, I remembered that I had better start the long trek back down to Mucugê. It was getting late, and hiking at night with fog in trailess rocky terrain is not my idea of a good time, especially because of the poisonous snakes that emerge at sunset! Nonetheless, it was hard to drag myself away from the summit of the Serra do Sincorá. And right before leaving, I stumbled on yet another surprising discovery. Growing in small cracks of sandstone dripping with water, I refound a yet-undescribed species of *Genlisea*. I had originally discovered it near the Fumaça Falls (the

second highest waterfall in Brazil), located further north along the Chapada Diamantina. It is similar to *G. violacea* and has pink-purple flowers with a curious wide gap between the upper and lower corolla lips. I had only seen this *G.* sp. once before, so I was really happy to see it again on the Serra do Sincorá. Unfortunately, like at the Fumaça Falls, I could only find a frustratingly small amount of plants—not enough for an herbarium specimen, and thus not enough to formally describe this new taxon yet. I'll have to do a bit more hunting for this species on the Chapada Diamantina in the future.

As you can imagine, I spent more time than I had to spare on that mountaintop, studying *G. uncinata* and *G.* sp., so I had to run back to Mucugê, slipping and sliding down the mountainside full of loose rubble. Luckily I arrived at the base of the mountain before it got too dark, and it was easy, even in the dark, to follow a road for the last few km back to town.

My next stop on the Chapada Diamantina was another small town called Catolés. This town sits at the base of the Morro do Barbado which, reaching slightly over 2000m in altitude, is the highest mountain in the state of Bahia. I had never been there before, but knew from herbarium specimens that there were lots of interesting carnivorous plants in the area. The big problem was getting to Catolés: it is so isolated that not even buses travelled there! I had to catch two rides along bumpy dirt roads, all the while carefully cradling, like a loving father, my bagfull of *G. uncinata* plants with their huge and succulently brittle inflorescences.

Catolés turned out to be one of the richest carnivorous plant areas I have ever visited, so I will not even begin to describe the nearly thirty species found there! Yes, I also found *G. uncinata* on the Morro do Barbado, where it was actually quite common between 1600-1950m of altitude, in habitats similar to those I had seen at the type location on the Serra do Sincorá. Contrary to the situation at Serra do Sincorá, this time I found plenty of ripe seeds to collect.

This new collection from the Morro do Barbado—only the second known for *G. uncinata*—suggests that it may actually be widely distributed throughout the Chapada Diamantina. Maybe botanists have simply been too lazy to hike up and explore the mountaintops! In fact, I subsequently found three new species of *Genlisea* further south in the state of Minas Gerais. These are more or less intermediate in size and robustness between *G. uncinata* and *G. violacea*. One of these is especially similar to *G. uncinata* but lacks the hooked spurs.

In conclusion, I am very happy to write that *G. uncinata* has now been successfully introduced into cultivation around the world (including tissue culture), through seeds collected on this trip to Mucugê and Catolés, and also through seeds obtained from cultivation in São Paulo. Although Murphy's Law stipulates that species which are morphologically spectacular are also always frustratingly difficult or slow to grow, *G. uncinata* is an exception. It is surprisingly easy to grow and is not at all picky like most other species of *Genlisea*. Specimens of *G. uncinata* grown by my friend Fábio Pinheiro here in São Paulo flourished and produced enormous, highly branched flower scapes over 1.2m in length!

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New Cultivars

Keywords: cultivar: *Nepenthes* 'Bruce Bednar', *Nepenthes* 'Frau Anna Babl', *Nepenthes* 'Marie', *Nepenthes* 'Nora'.

Nepenthes 'Bruce Bednar'

Submitted for registration 10 January 2000

I developed this new hybrid in February 1994. The seed parent was *N. kampotiana* × *maxima*, the pollen parent was *N.* × *deslogesii*. As such, the complete parentage of this complex cross is *N.* (*kampotiana* × *maxima*) × ((*maxima* × *veitchii*) × (*northiana* × *maxima*)).

The leaves are petiolate, and are approximately 20 cm long and 6 cm wide. The leaf tendrils are roughly one-half to two-thirds the length of the leaves.

The lower pitchers of *Nepenthes* 'Bruce Bednar' are urceolate (or slightly elongated), approximately 10 cm long, and bear fimbriate wings 5-10 tall. The mouth is 1 cm wide and 2.4 cm tall. The peristome is moderately wide, red, and undulate on the outer margins. The lid is ovate (1.8 cm wide, 3.3 cm long) with an obtuse apex. Numerous glands are present on the underside of the lid. The apical spur is 2-5 mm long. The entire outer surface of the pitcher is green and mottled with elongated red spots. These spots are more common on the upper half of the pitchers. A bright red stripe runs along the back of the pitcher from near the base all the way up to the base of the lid. See Figure 1, page 89.

The plant is covered with short, fine brown hairs. These are sparse or absent on the pitcher, although they are found on the lid.

This plant name was named on 5 December 1995, but only now is being established. It is named for Bruce Bednar of Lee's Botanical Gardens, in Florida USA (with Bruce's permission!). In order to maintain this complex hybrid's features, it must be propagated vegetatively only. I am propagating this for wide availability.

—Andrew Marshall • Cascade Carnivorous Plants • P.O. Box 20 • Tenino WA 98589 • USA

Nepenthes 'Frau Anna Babl'

Submitted for registration on 31 January 2000

Nepenthes 'Frau Anna Babl' is distinguished by its large lower pitchers which measure 20 cm (8 inches) in length and its teardrop-shaped, bright scarlet peristome which is about 1.2 cm (0.5 inch) wide. The interior of the pitcher is creamy yellow-white. The exterior of the pitcher is flushed with red in the upper part, and has prominent fringed wings. The oval lid is slightly domed with a strong keel. See Figure 2.

Marie Baumgartl developed this plant in the early 1990s. It is a cross of *Nepenthes alata* × *truncata* with a plant of unknown parentage found at the botanical garden at Sens, France, by Marcel LeCoufle. Marie Baumgartl coined the cultivar name some time in 1995. The name honors Marie Baumgartl's mother. This cultivar should only be reproduced by vegetative means.

—Peter D'Amato • California Carnivores • 7020 Trenton-Healdsburg Road • Forestville CA 95436 • USA • calfcarn@aol.com

Nepenthes 'Marie'

Submitted for registration on 2 February 2000

The most striking characteristics of the cultivar *Nepenthes* 'Marie' include a broad, slightly fluted peristome which is up to 1.2 cm (0.5 inch) wide and which is at first striped but then becomes fully rust-red with age; a creamy interior pitcher surface which is sparsely flecked with red; and a large, domed, oval-shaped lid with a strong keel and brightly crimson undersurface. The wings are reduced, and the flask-shaped pitcher body is lemon-green, lightly flecked with red on its upper part (see Figure 3, page 89). The pitcher is more blushed in high light levels. Pitchers can be up to 23 cm (9 inches) in length. The form of upper pitchers is unknown.

Marie Baumgartl developed this plant in the early 1990s. It is a cross of *Nepenthes alata* × *truncata* with a plant of unknown parentage found at the botanical garden at Sens, France, by Marcel LeCoufle. I coined the cultivar name some time in 1995. The name honors Marie Baumgartl. This cultivar should only be reproduced by vegetative means.

—Peter D'Amato • California Carnivores • 7020 Trenton-Healdsburg Road • Forestville CA 95436 • USA • califcarn@aol.com

Nepenthes 'Nora'

Submitted for registration on 4 February 2000

Nepenthes 'Nora' has streamlined lower pitchers which measure up to 18 cm (7 inches) in length. Its teardrop shaped peristome is deep red, very slightly fluted, and barely 0.6 cm (1/4 inch) wide. The interior of the pitcher is cream-colored. The heart-shaped lid is coarsely and irregularly shaped in outline, inflexed, and heavily streaked and spotted red. It becomes dark red where it meets the peristome. The wings are prominent and finely fringed. The pitcher body's exterior is a pale lime-yellow, flecked with dark red streaks, and suffused in lighter red along the upper part. The upper pitchers are unknown. See Figure 4, page 89.

Marie Baumgartl developed this plant in the early 1990s. It is a cross of *Nepenthes alata* × *truncata* with a plant of unknown parentage found at the botanical garden at Sens, France, by Marcel LeCoufle. I coined the cultivar name in 1995. The name honors Eleonore D'Amato. This cultivar should only be reproduced by vegetative means.

—Peter D'Amato • California Carnivores • 7020 Trenton-Healdsburg Road • Forestville CA 95436 • USA • califcarn@aol.com

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Looking Back: CPN 25 years ago

Joe Mazrimas revealed his newly discovered technique for obtaining viable pollen from *Heliamphora*: "He removes the anthers from the flower when they are plump and yellow-green and simply dries them in a warm place until the anthers turn bright yellow. The anthers are then broken up and there is a copious pollen yield; the pollen is viable as indicated by mature, germinable seed obtained from flowers pollinated with the material."

Figure 1. *Nepenthes* Bruce Bednar

Figure 2. *Nepenthes* Frau Anna Babl photo E.M. Salvia

Figure 3. *Nepenthes* Marie, photo E.M. Salvia

Figure 4. *Nepenthes* Nora, photo B. Meyers-Rice

Carnivores on Stamps and Currency

Richard Ellis • 1276 Cavan St. • Boulder, CO 80303 USA • ricell@juno.com

Keywords: arts: stamps.

Many of us carnivorous plant enthusiasts are collectors at heart. We tuck moss-filled aquariums in all the corners of our homes, and when we inevitably have nowhere else to put another *Nepenthes* or *Sarracenia* hybrid we start collecting pygmy sundews. If this sounds like you, then you should consider collecting carnivorous plant stamps and currency. A complete collection will fit into a small notebook and you do not need to find someone to water it when you go on your next scenic bog vacation!

The last Carnivorous Plant Newsletter article devoted to stamps was in the March 1981 issue. Since then the number of carnivorous plant stamps has more than tripled, and the number of carnivorous plant genera pictured on stamps has more than doubled. There has even been a new banknote featuring a carnivorous plant. Pitcher plants are still the most popular carnivorous plant subjects, with *Nepenthes* being the most-portrayed carnivorous plant genus. As noted in the 1981 article, the Seychelles had produced two stamps of *Nepenthes pervillei*; they have since added two more to their stamp repertoire. In 1983 they issued a series commemorating the centennial of Marianne North's visit to the Seychelles. Marianne North, the botanical illustrator for whom *Nepenthes northiana* was named, painted many members of the Seychelles' flora, and four of her works, including her rendering of *Nepenthes pervillei* (Back cover, top left), are reproduced in this stamp series. Another Seychelles *Nepenthes pervillei* stamp features an immature pitcher and was issued in 1990 for the International Garden and Greenery Exposition held in Japan that year. Both of these Seychelles stamp series are available as separate stamps or as "souvenir sheets" which have all four stamps and a decorative border.

Several countries have honored their *Nepenthes* on stamps for the first time. In 1986, New Caledonia portrayed *Nepenthes vieillardii* on a 73F stamp, while in the following year Palau issued a seventeen stamp series of native plants that included *Nepenthes mirabilis* on the $2 stamp (Back cover, top row). In 1996, Malaysia issued a wonderful series of four *Nepenthes* stamps depicting upper and lower pitchers of *N. sanguinea, N. macfarlanei, N. rajah* and *N. lowii* (Back cover, top row). Hybrid *Nepenthes* have also made an appearance on stamps. A 1991 series from Sierra Leone, honoring the Munich Botanic Gardens, shows *Nepenthes* × *mixta*, a manmade cross of *N. maxima* and *N. northiana*, while a 1995 series from Tanzania depicts *Nepenthes* × *hybrida* (Back cover, second row), a manmade cross of *N. gracilis* and *N. khasiana*.

Three cheers for Laos, which made the first stamp series devoted entirely to our favorite plants! This series of six *Plantes Insectivores* was issued in 1995 and shows *Nepenthes villosa* (Back cover, second row), *Dionaea muscipula* (Back cover, second row), *Sarracenia flava*, *Sarracenia purpurea*, *Nepenthes ampullaria* and *Nepenthes gracilis*. It seems a little ironic that Laos would be the first country to put the Venus Flytrap on a stamp and detail oriented carnivorous plant enthusiasts will no doubt notice that the artist put seven trigger hairs on one lobe and eleven on the other. The stamp of *Nepenthes gracilis* is a singlet souvenir sheet with the majority of the image running off the stamp and rendered on the border.

A series titled "Wildlife Stamp Week" from Malaysia, issued in 1996, also has a *Nepenthes* along the margins. While the foci of this souvenir sheet are animals, there is an unmistakable *Nepenthes* lurking in the bottom right corner at the foot

of a tricolored squirrel.

Other new carnivorous plant stamps of previously represented genera have come from The Faroe Islands, Japan, Sierra Leone, and Ireland. The Faroe Islands' stamp depicts *Pinguicula vulgaris* as one in a series of four on native wildflowers (Back cover, third row). The most recent carnivorous plant stamp that I am aware of shows *Aldrovanda vesiculosa* in Hozoji-numa Pond and was issued by Japan in 1997 (Takai, 1998). Two new *Sarracenia* stamps celebrate botanic gardens. The first was produced by Sierra Leone in 1991 and honors the Munich, Brooklyn and Tokyo botanic gardens on three sheetlets. The series on the Munich gardens shows *Sarracenia flava* (Back cover, third row) as well as the above mentioned *Nepenthes* × *mixta*. Ireland issued the second new *Sarracenia* stamp in 1995 to commemorate the 200th anniversary of the National Botanic Gardens, Glasnevin. This stamp shows *Sarracenia* × *moorei*—the first artificially produced *Sarracenia* hybrid—and is named after Dr. David Moore, the director of the gardens at that time (Nelson, 1998).

In addition to the first stamp of the Venus Flytrap in the series from Laos, there are several genera of carnivorous plants that are new to the world of philately, including *Triphyophyllum*, *Drosera*, *Utricularia*, *Darlingtonia* and *Cephalotus*. The Ivory Coast issued the first stamp of the rarely seen *Triphyophyllum peltatum* in a series of three native plant stamps in 1985 (Back cover, third row). France has the honors of issuing the first *Drosera* stamp with a depiction of *Drosera rotundifolia* in a series on wetland flora (Back cover, third row). Thailand issued an attractive series of four stamps, three of which are *Utricularia*, including *U. delphinioides*, *U. minutissima* (Back cover, fourth row) and *U. bifida*. The United Nations continued its annual series on endangered species, and in 1996 issued a series of twelve plants, including *Darlingtonia californica* and *Cephalotus follicularis* (Back cover, fourth row).

Currency does not change as quickly as stamps but carnivorous plants are even appearing on money. The 1981 Carnivorous Plant Newsletter article described the Newfoundland pennies with *Sarracenia purpurea* and the June 1985 Carnivorous Plant Newsletter had a picture of the Malaysian $20 note with *Nepenthes rafflesiana*. Recently, the $5 note from Brunei began sporting an engraved rendition of *Nepenthes lowii*.

If all these new stamps of carnivorous plants have you itching to start your own collection, then here are a few hints. Knowing the stamp number will help you communicate what you are looking for to stamp dealers. Stamp dealers in different countries use different numbering systems. Scott is used almost exclusively in the United States while Stanley Gibbons, Michel and Yvert & Tellier are some of the most common systems elsewhere. Table 1 has a complete listing of Scott numbers and a partial list of other numbering systems. In most cases, the number for the individual stamp is listed but be aware that the same stamp alone, or in a souvenir sheet, can be assigned different numbers. Most of these stamps are relatively inexpensive but it can be quite a challenge to locate them. Stamp dealers are typically reluctant to break up a set of stamps to sell the one of interest so be prepared to purchase the whole series. Stamp shows are a good place to check out multiple stamp dealers at the same time. Be prepared to search through boxes of stamps labeled "flowers." Your local dealers can tell you what stamp shows will be occurring in your area. Lastly, for those with access to the World Wide Web, there are two sites devoted to carnivorous plant stamps, one maintained by myself and another by Ruedi Fürst, a collector in Switzerland:

http://www.geocities.com/RainForest/Vines/8564/

http://www.schulnetz.ch/unterrichten/fachbereiche/botanik/cp_homepage/insektivoren_anders.html

Table 1: Numbers for Carnivorous Plant Stamps

Country	Year	Gibbons	Michel	Scott	Yvert	Plant pictured
Canada	1966	552	352	427	352	*Sarracenia purpurea*
Faroe Islands	1988	160	159	172	159	*Pinguicula vulgaris*
France	1992	3087	2911	2299	2767	*Drosera rotundifolia*
Guyana	1971	542	395	133		*Heliamphora nutans*
Ireland	1978	423	392	430	380	*Pinguicula grandiflora*
	1995	974	918	984	921	*Sarracenia × moorei*
Ivory Coast	1985		885	769c	724c	*Triphyophyllum peltatum*
Japan	1978	1497	1356	1320	1258	*Pinguicula ramosa*
	1997			2315	2358	*Aldrovanda vesiculosa*
Laos	1974	394	381	C116	115	*Nepenthes mirabilis*
	1995	1461		1237		*Nepenthes villosa*
	1995	1462		1238		*Dionaea muscipula*
	1995	1463		1239		*Sarracenia flava*
	1995	1464		1240		*Sarracenia purpurea*
	1995	1465		1241		*Nepenthes ampullaria*
	1995			1242		*Nepenthes gracilis*
Madagascar	1973	255	692	496	532	*Nepenthes pervillei*
	1973	256	693	497	533	*Nepenthes pervillei*
Malaysia	1996	599		578	598	*Nepenthes sanguinea*
	1996	600		579	599	*Nepenthes macfarlanei*
	1996	601		580	600	*Nepenthes rajah*
	1996	602		581	601	*Nepenthes lowii*
	1996	626		604	B/F16	Unidentified *Nepenthes*
New Caledonia	1986	797	793	549	527	*Nepenthes vieillardii*
Palau	1987	186	186	140	168	*Nepenthes mirabilis*
Romania	1966	3399	2527	1867	2232	*Aldrovanda vesiculosa*
Seychelles	1970	288	282	280	275	*Nepenthes pervillei*
	1977	418	408	402	386	*Nepenthes pervillei*
	1983	571	543	527	538	*Nepenthes pervillei*
	1990	778	725	702	715	*Nepenthes pervillei*
Seychelles Zil Eloigne Sesel	1980	15	15	15	15	*Nepenthes pervillei*
Sierra Leone	1991	1692	1682	1424e	1354	*Sarracenia flava*
	1991	1698	1688	1424k	1360	*Nepenthes × mixta*
St. Pierre & Miquelon	1962	419	393	C24	27	*Sarracenia purpurea*
Tanzania	1995	1920	1883	1306	1705	*Nepenthes × hybrida*
Thailand	1995	1748	1613	1584	1589	*Utricularia delphinioides*
	1995	1749	1614	1585	1590	*Utricularia minutissima*
	1995	1747	1615	1587	1592	*Utricularia bifida*
United Nations Geneva	1996	G293		283	311	*Darlingtonia californica*
United Nations New York	1996	696		676	697	*Cephalotus follicularis*

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Lubomír Adamec (Institute of Botany AS CR, Dukelská 135, CZ-379 82 Trebon, Czech Republic, adamec@butbn.cas.cz) sent us an update on red Australian *Aldrovanda* populations: Recently, Allen Lowrie discovered a new red *Aldrovanda* site. This billabong (a pool with fluctuating water level) that also contains *Nymphaea* sp., is near Mertens Creek above Big Mertens Falls in Kimberley, Western Australia. The plants of this strain have the same color and overwintering characteristics as the other two strains I described in my article in Carnivorous Plant Newsletter (1999, 28: 128-132).

Angie Nichols (sunpitcher@aol.com) is growing *Heliamphora tatei* in South Carolina, USA, and excited the internet community recently when she described her air layering techniques: "I cut the stem halfway through, dusted the cut with rooting hormone (Rootone), and wedged a small piece of perlite in the cut so it would not close. After wrapping the stem in live sphagnum, I covered it all with plastic wrap. After a few weeks, the upper part of the plants was almost completely severed from the lower part. I did not think the rooting process had happened, and I had decided to just remove the top and stick it in a pot and hope for the best. I was pleasantly surprised to see very large, white, succulent roots! These roots were different from the normal, fibrous roots. All the nodes on the stem below the air-layer cut have produced small pitchers, and plantlets are also springing forth from the underground parts! The entire rooting process took about four or five weeks." Angie noted that since her plant was outgrowing her 260 liter (65 gallon) terrarium, she was forced to keep her plant on its side during the entire process. She rotated it regularly!

Chris Teichreb (3750 Dollarton Highway, North Vancouver, BC, V7G 1A2, Canada, cjteichr@sfu.ca) had some comments on CO_2 generators, described in Carnivorous Plant Newsletter (1999, 28, 132): First, injecting CO_2 straight into the aquaria with the tubing does not really result in large increases in dissolved CO_2 concentration, as most simply bubbles to the top and escapes. It is much more efficient to use either a CO_2 reactor (an upturned clay saucer under which the tubing is fed works fine) and an airstone which breaks up the large bubbles into finer ones allowing for greater CO_2 surface area contact with the water. If you are using a filter for water movement, the tubing can be fed directly into the uptake tube where the CO_2 will be drawn in, broken up, and dispersed back into the aquaria. This only works with non-bubbling filters.

Second, people will get better results if they use champagne or brewer's yeast, which is selected to withstand the higher alcohol content created (which is what ultimately kills the yeast). More sugar can then be added to prolong the life of the yeast, provided the alcohol content is not too high.

Finally, and most importantly, this is a system under pressure, which is why the CO_2 is forced out in the first place. Some precautions must be taken. Do not use glass bottles for your reaction chamber (an explosion of glass is not nice!). Make sure that the tubing does not become clogged. If it does, the pressure will build, and it will eventually break somewhere along the line (usually where it was siliconed). In this case, you will end up with a huge mess of yeasty alcohol all over your ceiling, carpet, drapes, pets, etc!

If you use champagne yeast, concentrated liquid apple juice and the sugar, you can have a fine wine by the time everything has done brewing! More about injecting CO_2 into aquaria can be found on the world wide web at http://www.thekrib.com.

Hideka Kobayashi (1115 Plant Science Lab, 1201 S. Dorner Dr., Urbana, IL 61801, hkobayashi4@hotmail.com) wrote to us about research he is doing with *Drosera*. He is seeking *Drosera linearis* seeds or plants for his research. If any members can send him some, he would be willing to trade some plants from his varied collection.

Barry Meyers-Rice (P.O. Box 72741, Davis CA 95617 USA) provided information on regulations regarding international trade of carnivorous plants: "In April 2000, the 11th biennial Conference of the Parties to CITES (Convention on International Trade in Endangered Species) took place in Nairobi. A number of amendments were proposed to change the listings of carnivorous plants in the CITES regulations. In particular, all species of *Byblis, Cephalotus*, and *Darlingtonia* have been removed from CITES control. This was judged appropriate because field collection is judged likely to be having little affect on the wild populations. A number of experts, including ICPS staff, were consulted in preparing the proposals for the Conference."

International Carnivorous Plant Society Seed bank

John Brittnacher, Coordinator • P.O. Box 72222 • Davis, CA 95617 • USA
john@carnivorousplants.org

Darlingtonia californica
D. californica—Josephine Co., Oregon
Drosera anglica (Californian Y Hawaiian)
D. burmannii—Beerwah, Queensland
D. capensis—green
D. capensis—narrow leaf
D. capensis—narrow leaf, Albion, California
D. capensis—purple flower
D. capensis—white flower
D. capillaris
D. glanduligera
D. intermedia
D. intermedia—Carolina giant form
D. intermedia—southeast Virginia
D. macrantha subsp. *macrantha*—pink flower
D. pettolaris (uncertain ID)
D. rotundifolia—Manchester, New Jersey
D. rotundifolia—Mendocino Co., California
D. rotundifolia—Willow Lake, Nevada Co. California
D. stenopetala
D. stolonifera subsp. *rupicola*
D. stolonifera subsp. *stolonifera*
Nepenthes bicalcarata
N. fusca
N. reinwardtiana
N. stenophylla
Sarracenia alata
S. flava—Ben Hill Co., Georgia
S. flava—Hampstead, North Carolina
S. leucophylla
S. minor—Fitzgerald, Ben Hill Co., Georgia
S. purpurea subsp. *purpurea*
S. purpurea subsp. *purpurea*—marl bog, Bruce, Canada
S. purpurea subsp. *purpurea*—north Ohio plains

All seed contributions are gratefully accepted. You must use bubble wrap to protect the seeds from shipping damage.

The seed bank listing is only an approximation to the current seed bank inventory. Before ordering any seed you should request an updated listing from John Brittnacher (the Seed Bank Coordinator). A plant followed by an entry in parentheses means there are a limited number of seed packets remaining.

All orders and correspondence with the seed bank must be accompanied by a self addressed, stamped envelope. Postage is $.33 for a seed list, $.55 when ordering seed. Seed costs $1 per packet. IRCs are accepted. You should specify alternative seeds with each order in case your first choices are no longer in stock.

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Species/Hybrid Name	Native Area, Description Leaf Span Diameter in Inches	US $
Brocchinea reducta	Guyana Highlands, S.A. (5" tall pitchers)	30
Cephalotus follicularis	Australia (1.5" diameter) (3 plants)	10
Heliamphora ionasii	Ilu Tepui, Venezuela (1.5" pitchers)	45
H. minor	AuyanTepui, Venezuela (4" pitchers)	80
H. minor	Aeopan Tepui, Venezuela, hairy, 4"	80
H. nutans	C. Kukenam, Venezuela (1.5" pitchers)	30
H. tatei	C. Huachamachari, Venezuela (2" pitchers)	55
N. alata	Palawan, Philippines (5" diameter)	20
N. alata	Philippines (dark red traps, 5" diameter)	30
N. albo-marginata	Penang, Malaysia (green trap, 5" diam.)	20
N. albo-marginata	Penang, Malaysia (tall red variety, 5")	35
N. ampullaria	Sarawak, Malaysia (green, 5" diameter)	20
N. ampullaria	Sarawak, Malaysia (speckled, 5" diam.)	20
N. aristolochioides	Sumatra (>2" diameter)	50
N. bellii	Mindanao, Philippines (4" diameter)	35
N. bicalcarata	Brunei, Borneo (3" diameter)	20
N. bicalcarata	Borneo (>7" diameter)	30
N. bongso	Indonesia (4" diameter)	50
N. burbidgeae	G. Kinabalu, Sabah (4" diameter)	55
N. burkei	Philippines (>5" diameter)	25
N. caranculata	G. Sago, Sumatra (4" diameter)	25
N. clipeata	G. Kelam, Borneo (4" diameter)	60
N. dansei	Waigeo Island, Irian Jaya (5" diameter)	40
N. deaniana	Palawan (>3" diameter)	50
N. distillatoria	Sri Lanka (yellow/green, >3" diam.)	15
N. distillatoria	Sri Lanka (pink, >3" diameter)	15
N. distillatoria	Sri Lanka (purple, >3" diameter)	30
N. ephippiata	G. Raya, Borneo (4" diameter)	40
N. eustachya	K. Sembilan, Sumatra (4" diameter)	40
N. eymae	G. Lumut, Sulawesi, Indonesia (3")	50
N. faizaliana	Borneo (2" diameter)	35
N. fusca	Sabah (>4" diameter)	15
N. gracilis	Talangka Rajah, Borneo (3" diameter)	15
N. gracillima	Genting Highlands, Malaysia (4" diam.)	35
N. gymnamphora	G. Singgalang, Sumatra (4" diameter)	30
N. hamata	Sulawesi (3" diameter)	95
N. hirsuta	Sarawak, Malaysia (3" diameter)	25
N. hispida	Malaysia (>6" diameter)	40
N. insignis	E. Biak, Indonesia (4" diameter)	45
N. khasiana	Meghalaya, India (4" diameter)	15
N. lamii	Irian Jaya (3" diameter)	50
N. lowii	Brunei (3" diameter)	45
N. lowii	G. Mulu, Sarawak (3" diameter)	40
N. lowii	G. Trusmadi, Sabah (3" diameter)	40
N. lowii	G. Murud, 6400 ft (2" diameter)	40
N. lowii	G. Kinabalu, Sabah (2" diameter)	50
N. macfarlanei	Genting Highlands, Malaysia (4" diam.)	25
N. macrophylla	G. Trusmadi, Borneo (2" diameter)	80
N. madagascariensis	Madagascar (2" leaves, >4" diameter)	15
N. maesolensis	Madagascar (2" diameter)	30
N. maxima	Rantepao, Sulawesi (4" diameter)	30
N. maxima	Celebes (> 4" diameter)	30
N. maxima	Anggi Lakes, Irian Jaya (4" diameter)	35
N. maxima	G. Coblay, 7260 ft. elevation, 3" diam.	40
N. maxima	Indonesia (>5" diameter)	35
N. merrilliana	Mindanao, Philippines, 3" diameter	30
N. mirabilis	Cape York, Australia, 4" diameter	15
N. mirabilis	Brunei, Echinostoma, 3" diameter	30
N. mirabilis	Macau, China, 5" diameter	15
N. muluensis	G. Mulu, Sarawak, >4" diameter	40
N. murudensis	G. Murud, 7000 ft., 3" diameter	35
N. neoguineensis	Angasa, Irian Jaya, 5" diameter	60
N. northiana	Bau, Sarawak, >5" diameter	30
N. pervillei	Seychelles, 4" diameter	40
N. pilosa	G. Batu Buli, Sarawak, 2" diameter	30
N. rafflesiana	Bau, Sarawak, giant form, 5" diameter	30
N. rafflesiana	Brunei, typica, 5" diameter	15
N. rafflesiana	Brunei, elongata, 3" diameter	30
N. rafflesiana	Brunei, gigantea, 3" diameter	30
N. rajah	G. Kinabalu, Sabah, 2" diameter	25
N. reinwardtiana	Borneo, green trap, 4" diameter	20
N. reinwardtiana	Telupid, Sarawak, red trap, 3" diam.	30
N. reinwardtiana	G. Murud, 6900 ft., 2" diameter	35
N. sanguinea	Genting Highlands, Malaysia (4" diam.)	20
N. sibuyanensis	Sibuyan, Philippines (4" diameter)	30
N. spathulata	Sumatra, >4" diameter	40
N. stenophylla	Sarawak, >4" diameter	45
N. sumatrana	Siboiga, Sumatra, 4" diameter	30
N. talangensis	G. Talang, Sumatra, 4" diameter	35
N. tentaculata	G. Murud, (3" diameter)	30
N. thorelii	Phu Radung, E. Thailand (5" diameter)	20
N. tobaica	Sumatra (red pitcher), 4" diameter	35
N. treubiana	Siboiga, Sumatra, (5" diameter)	35
N. truncata	Philippines (>7" diameter)	35
N. veitchii (highland)	Batu Lawi, Sarawak, 4" diameter	25
N. veitchii (lowland)	Sungai Samba, Borneo, (4" diameter)	25
N. ventricosa	Philippines (3" leaves, 5" diameter)	10
N. ventricosa	Philippines (green traps with dark red peristome, very unusual, 6" diameter)	35
N. vieillardii	New Caledonia (3" diameter)	25
N. villosa	G. Kinabalu, Sabah (2" diameter)	50
	Selected Hybrids	
N. bicalcarata x ampullaria	Sipitang, Sabah (very vigorous with dark red green leaves, 5" diameter)	30
N. fusca x burbidgeae	(5" diameter)	35
N. x hookeriana	Brunei, Borneo (5" diameter)	30
N. khasiana x truncata	(5" diameter)	20
N. sanguinea x truncata	(4" diameter)	30
N. spathulata x veitchii	(4" diameter)	30
N. truncata x maxima	(5" diameter)	30
N. truncata x ventricosa	(5" diameter)	30
N. veitchii x lowii	(5" diameter)	30
N. ventricosa x inermis	(6" diameter)	20
	Victorian Hybrids	Spectacular Traps (>6" diameter)
N. x chelsonii	London, Late 1800's	20
N. x coccinea	London, Late 1800's	20
N. x dyeriana	London, Late 1800's	50
N. x mixta	London, Late 1800's	35
N. x wrigleyana	London, Late 1800's	20


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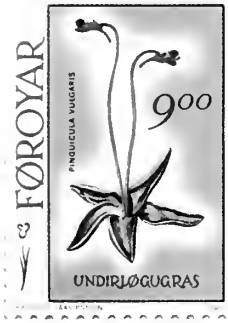
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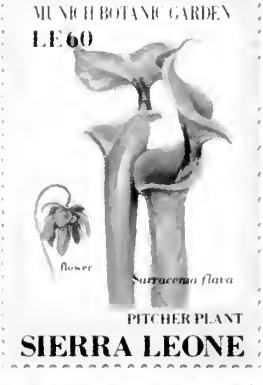
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